J. Agric. Sci. Mansoura Univ., 32 (10): 8745 - 8756, 2007

AGROECOLOGICAL ASSESSMENT OF LAND SUITABILITY AND CAPABILITY IN SOME DESERTIC FRINGES IN EL-GIZA GOVERNORATE, EGYPT.

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ABSTRACT

An agro ecological land quality evaluation of Land suitability and capability in some Desertic Fringes in El-Giza Governorate was determined using the MicroLEIS IP (Integrated Package), which included the assessment of the general land use capability(Cervatana model) , land suitability for different agriculture crops(Almagra model). According to the model prediction, most of the studied area was classified as (S3lb), which indicate moderate capability with soil being the limiting factor. Land included in this class has certain topographic and climatic limitations, which somewhat reduce the productive capability of certain crops. The geo-spatial distribution of the soil suitability in the studied area indicate that more than 10% is classified as the optimum suitable soils (S1) for cotton cultivation. On the other hand, more than 7% is classified as the optimum suitable soils (S1) for sugar beat and more than 20% is classified as (S2) for cotton, sugar beat, peach, citrus, sun flower, alfa alfa, potato and soybean cultivation, however the mapping unitsEP31, EP32 and EP33 indicate poor suitability for all selected crops (S4 and S5) due to their high content of coarse fragments, moreover, the excessively drainage condition and the high content of calcium carbonate and salts. Accept that, they have moderate suitable to cultivate Olive. Furthermore, the model predicted the approximately 36 to 40% of the studied area has moderate suitability (S3) for olive, wheat, maize and melon.

INTRODUCTION

Land capability evaluation refers to a range of major kinds of land uses, such as agriculture, forestry, livestock production and recreation. The most widely used categorical systems for evaluating agricultural; and is termed land capability classification (Klingebiel and Montgomery, 1961). Soils in the capability unit are sufficiently uniform to: produce a similar kind of cultivated crops and pasture plants with similar management practices, require similar conservation treatment and management, and have comparable potential productivity (Sys *et al.*,1991-Part II). The system is concerned with the fitness of land to support land use.

Land suitability is the fitness of a given land-mapping unit for a land utilization type (FAO, 1976). Land suitability classification is based on four levels of generalization:

- Land suitability orders reflecting kinds of suitability; i.e., "suitable" (S) or "not suitable" (N).
- Land suitability classes indicating the degree of suitability within an order.
- Land suitability subclasses specifying kind(s) of limitation or kind(s) of required improvement measures within classes.
- Land suitability units indicating differences in required management within subclasses.

Capability is viewed by some as the inherent capacity of land to perform at a given level for a general use, and suitability as a statement of the adaptability of a given area for a specific kind of land use; others see capability as a classification of land primarily in relation to degradation hazards, whilst some regard the terms "suitability" and "capability" as interchangeable.

In Egypt, degradation of land resources has become the main constraint to development. In agriculture cultivated lands is being further reduced by industrial and urban expansion resulting in vertical agriculture expansion, which depending heavily on the use of chemical fertilizers and pesticides. Agricultural land quality/health is decreasing due to soil salanization and alkalization, water logging and non point sources of population by agrochemicals from the extensive use of fertilizers and pesticides as well as domestic waste (Kishk, 2002)

The main goal of this study is to use the agro ecological assessment of land suitability and capability in some Desertic Fringes in El-Giza Governorate to determine the current use of this soil and its suitability and capability to the soil characters and properties. The MicroLEIS IP (Integrated Package), which included an assessment of the general land use capability and land suitability for different agriculture crops.

Description of the studied area

Location and climate

The study area is shown on the survey maps NH 36-E6c Ahramat El-Giza, NH 36-E6d Helwan, NH 36-E6a Brnesht, NH 36-E6b El-Saff, NH 36-E3c El-Wasta and NH 36-E3d Wadi El-Rashrash, Scale 1:50.000 and its total area is about 1101 Km^2. it is located in the southern part of the Nile Delta east and west the flood plain. The study area is considered as semi-arid zone. Table (1) shows the average climatic parameters over thirty year's period after the Economic Agricultural Research Institute (EARI, 2004).

Geology and Geomorphology

From the geological point view from (EGPC,1988)., the area is covered by sedimentary materials belonging to Cretaceous (sand stone) , Eocene (lime stone, sand) and Pliocene (River silt , sand, gravels)

Based on morphological studies from a semi- detailed soil survey which was carried out for the Eastern and Western Desertic Fringes of El-Giza Governorate by Said (1962) and Arafa (1981) the studied area could be classified into the following geomorphic units.

- Interference zone
- The Eastern and the Western Desertic deposits adjacent to the flood plain.

Table 1: The average climatic parameters (over 30 years) after (EARI, 2004).

Month no.	Max. Temperature (ºC)	Min. Temperature (ºC)	Max.RH (%)	Min.RH (%)	Total Rain (mm)	Max. Soil Temperature at 20 cm (ºC)	Min. Soil Temperature at 20 cm (ºC)	ET_o (mm)
01	19	6.4	80.9	32.6	8	13.6	12.4	2.2
02	21.9	7.8	78.8	32.1	0	13.4	12.2	2.8
03	24.7	11.7	76.2	27.5	4	16.1	15.5	4
04	28.3	14.3	78.3	22.8	0	24.8	23.9	6.1
05	41.3	22.2	40.2	11.9	0	34.2	30.4	9.9
06	34.4	20.3	79.2	23.9	0	23.6	22.8	9.5
07	36.6	22.5	78.5	24.6	0	35.5	34.1	8
08	35.8	22.7	78.8	27.3	0	35.9	34.9	6.9
09	33.9	21.3	77.4	27.5	0	27.3	26.6	6.4
10	30.6	19.5	77.9	29.7	0	30.8	30	4.9
11	27.1	13.8	78.8	29.9	6	24.8	23.9	4.4
12	20.8	8.5	77.7	32.3	4	19.1	18.1	2.9

MATERIALS AND METHODS

Materials

- four topographic maps of the area sheets NH 36-E6c Ahramat El-Giza, NH 36-E6d Helwan, NH 36-E6a Brnesht, NH 36-E6b El-Saff, NH 36-E3c El-Wasta and NH 36-E3d Wadi El-Rashrash, scale 1:50.000 produce by the general survey authority (EGSA, 1992). Geological map of Egypt at, sheet NH36NW Cairo scale 1:50.000 printed from Ministry of Industry and Mineral Resources (1981)
- Aerial-photographs were taken during the year (1992) scale 1:40,000 which consist of (30) photographs (3runs).
- Controlled ortho-photo of E-Giza governorate, (EGSA, 1986).
- The geological map of Egypt scale 1:2000.000 produced by Ministry of Industry and Mineral Resources (1981).

Methodology

Field work and laboratory analyses

At representative units, the different spectral classes were assessed and soil samples were taken. The soil profiles were described morphologically in the field according to FAO (1990) and sampled for laboratory analyses.

The soil samples were air-dried, ground gently, then sieved through a 2 mm sieve, and gravel content was calculated. Mechanically analyzed according to the international method Piper, (1950) in the heavy texture samples & the dry sieving method according to Trask method, (1950) for light texture (sandy) samples. Calcium carbonate was determined using the collin׳s calcimeter method, Nelson (1982). The electric conductivity EC was determined conduct-metrically in the soil past extract, Soil Lab.Staff (1984), Cation exchange capacity, according to Hissink׳s method as modified by Goher (1954), Exchangeable cations were determined by using the ammonium acetate method Soil Lab. Staff (1984), Calcium and Magnesium were determined by versinate method, Jackson (1967)., Sodium and potassium were determined photo-metrically using a Perkin-Elmer flame photometer, Jackson (1967). (ESP) was calculated according to U.S.Salinity laboratory Staff (1945).

Land suitability and capability assessment

Agro ecological land quality evaluation was determined using MicroLEIS IP (Integrated Package) Pro&Eco model (de la Rosa *et al.*, 2000) and that package included the following assessment:

- General land capability.
- Land suitability for different agriculture crops.

According to FAO(1976) and Sys, *et al.*(1993)four capability classes and five suitability classeswere established. Foloing the maximum limitation method which is used in MicroLEIS, each of the previously mentioned soil criterion has a definite action and and role in agriculture production and the verification of the degree of a single variable is suffecent to classifity the soil in the corresponding cateogary. Thus, it is not necessary that all the classification factors are present in each class(Cardoso, 1970).

Spatial Analyses

The interpretation lines were transferred from the photographs to control mosaic of the area. Soil taxonomy (1999), were used to classify the different soil profile. Then the soil correlation between the physiographic and the taxonomic units, were designed in order to identify the major soil units of the studied areas (Elberson and Catalon, 1987).

Data input is the operation of interring both types of data, spatial and not spatial, into the GIS. The spatial data were input by digitizing the topographic map, controlled ortho-photo map and The geological map sheets, using TerraSoft GIS software (Digital Resource Systems, 1991). Attribute data were maintained in database management system represented by Arc View's table module and Excel spreadsheet (Microsoft Corporation, 1999).

Maps were layered into a group of features; each of them comprises a homogenous dataset. This step yields a digital vector database for the study area.The principle thematic layer is the soil map, where all other information is related to its polygons. For geometric correction, the co-ordinates were converted to the Universal Transverse Marcater (UTM) system using the ARC/INFO function project. Acrobat program was used to edit each information layer and to assign attributed to each polygon or line. Tables program was also used to assign additional attributes to soil polygons. Jointten function of Table program was used to have all needed attributed in one polygonal attribute table (PAT). Calculation function was used to compute the capability and suitability classes of different polygons.

The map files were transferred to JPEG format, which was accepted by Adobe-Photoshop Software. The later was used for the final output of the maps.

RESULTS AND DISCUSSION

Physiographic and soils of the studied area

The morpho-pedological study and analytical data of the Physiographic units in the studied area reveals that there is fourteen mapping unit .the Physiographic and soil mapping legend are shown in fig(1) and table(2), and the physical and chemical analyses are shown in tables (3,4)

General land capability

The MicroLEIS model provides prediction for general land use capability for a broad series of possible uses; land capability map is shown in fig (2) and table (5). According to the model production, most of the study area was classified as moderate capability,(S3lrb) in EP31 and WP31, and (S3lb) in EP32, EP33, WP32 and WP33, and (S3l) in AW21. They have moderate capability because of the moderately severe limitations that restrict the range of crops or require special conservation practices, these limitations are erosion risk for non Vegetation area , soil for the excessively drained area and Bioclimatic deficit for the aridity of these areas. These lands are low productivity for a fair range of crops, and improvement practices can be recommendable.

Four mapping unites have excellent capability S1; they are AC11, AC22, AW12, and AW22. They have excellent capability because of non significant limitations in use for traditional agricultural crops .These lands can be managed and cropped without difficulty under good management practices they are high in productivity.

Three mapping unites have good capability S2l; they are AC12, AC21 and AW11. Soil is the limiting factor and land included a coarse texture in some parts and moderately saline areas in the other parts, which somewhat reduce the productivity capability of certain crops.

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Table 3: Soil physical and chemical analysis

Mapping unit	Profile No.	Depth (cm)	Gravels (%)	Texture classes	CEC meq/ 100g soil	Exchangeable Cations meq/100g soil				ESP	pH	EC (ds/m)	CaCO3%
						Ca^{++}	Mg^{++}	Na^{+}	K^{+}				
WP31	**3**	**0 - 25**	13.87	S	6.41	3.14	2.13	0.64	0.43	9.98	7.52	5.88	6.52
		25 - 60	7.58	S	8.25	4.15	3.05	0.53	0.32	6.42	7.44	6.46	8.44
		60 - 75	4.31	S	9.42	4.68	2.8	1.08	0.74	11.46	7.28	7.92	5.32
		75 - 120	1.49	S	11.61	5.23	4.82	1.34	0.24	11.54	7.36	7.55	3.81
WP32	**1**	**0 - 20**	10.76	S	7.12	2.76	2.46	0.54	0.86	7.58	7.39	1.37	13.56
		20 - 40	6.79	S	10.37	5.56	2.59	0.72	0.78	6.94	7.25	3.50	12.28
		40 - 70	3.76	S	11.88	4.84	3.74	1.48	1.66	12.46	7.32	2.81	10.13
		70 - 120	4.17	S	10.18	4.61	3.49	1.15	0.82	11.30	7.21	3.63	8.24
WP33	**2**	**0 - 20**	7.67	S	10.69	4.75	3.68	0.47	0.69	4.40	7.23	5.38	3.87
		20 - 50	5.23	S	8.20	4.06	3.05	0.74	0.33	9.02	7.27	6.71	7.55
		50 - 75	2.96	S	9.32	4.43	3.17	0.81	0.40	8.69	7.11	7.11	4.28
		75 - 110	1.33	S	11.14	5.28	3.69	1.42	0.61	12.75	7.34	6.45	6.12
EP31	**16**	**0 - 25**	27.42	S.g	5.29	3.11	1.09	0.61	0.37	11.53	7.24	7.82	18.14
		25 - 70	34.94	S.g	5.10	2.42	1.66	0.55	0.34	10.78	7.30	5.86	20.29
		70 - 90	12.76	S	7.74	4.67	1.61	1.07	0.70	13.82	7.53	9.23	25.11
		90 - 140	15.63	S	6.86	3.51	1.74	0.88	0.58	12.83	7.61	8.95	31.72
EP32	**10**	**0 - 20**	16.60	S	9.50	4.61	2.80	1.10	0.66	11.58	7.23	2.20	25.41
		20 - 40	42.07	S.g	5.68	2.83	1.56	0.60	0.36	10.56	7.19	3.23	27.36
		40 - 110	51.01	S.g	5.52	2.78	1.65	0.65	0.38	11.78	7.17	4.18	30.22
EP33	**15**	**0 - 35**	13.10	S	11.28	5.82	3.60	1.20	0.61	10.64	7.19	7.41	31.64
		35 - 60	17.48	S	10.32	4.64	3.92	1.32	0.44	12.79	7.28	7.28	33.12
		60 - 90	30.82	S.g	5.33	2.96	1.22	0.78	0.48	14.63	7.23	6.11	39.28
		90 - 130	26.47	S.g	5.86	2.84	1.86	0.86	0.35	14.68	7.39	4.92	41.25

s= sand s.g= sandy gravel

Table 4: Continued

Mapping unit	Profile No.	Depth (cm)	gravel (%)	txture classes	CEC meq/100g soil	Exchangeable Cations meq/100g soil				ESP	pH	EC (ds/m)	CaCO3%
						Ca++	**Mg++**	**Na+**	**K+**				
AW11	**4**	**7**	0.00	S	8.82	4.67	2.81	0.72	0.57	8.16	7.23	1.25	6.72
		20 - 40	0.00	S	6.57	3.84	1.39	0.57	0.61	8.68	7.44	1.37	4.18
		40 - 55	0.00	S	6.22	2.53	2.31	0.66	0.52	10.61	7.63	1.51	4.75
		55 - 85	0.00	S.C.L	30.77	21.9	5.11	2.78	1.32	9.03	7.61	2.52	3.26
		85 - 120	0.00	S.C.L	27.18	18.22	5.56	2.34	0.9	8.61	7.58	2.67	4.67
AW12	**8**	**0 - 20**	0.00	S.C.L	27.8	20.21	4.16	2.28	1.03	8.20	7.35	2.33	3.16
		20 - 70	0.00	S	5.63	3.22	1.45	0.54	0.32	9.59	7.52	1.16	3.42
		70 - 90	0.00	S.L	24.52	16.23	5.34	2.18	0.67	8.89	7.28	1.86	6.18
		90 - 130	0.00	S.L	23.14	14.26	4.53	2.44	0.81	10.54	7.17	1.88	6.29
AW21	**6**	**0 - 20**	0.00	S.L	25.7	16.75	5.61	2.86	0.73	11.13	7.31	7.81	4.63
		20 - 50	0.00	L.S	13.25	7.36	3.34	1.9	0.55	14.34	7.17	8.18	4.81
		50 - 120	0.00	S.C.L	33.72	22.16	7.52	4.66	1.21	13.82	7.13	8.64	5.44
AW22	**5**	**0 - 30**	0.00	L.S	13.88	7.61	3.82	1.6	0.52	11.53	7.28	7.16	3.81
		30 - 60	0.00	S	5.52	3.47	1.09	0.52	0.36	9.42	7.35	7.97	6.96
		60 - 130	0.00	S	5.41	2.13	2.44	0.67	0.28	12.38	7.21	8.13	8.28
AC11	**17**	**0 - 30**	5.32	S.L	17.36	9.09	6.25	1.43	0.47	8.24	7.22	3.61	10.64
		30 - 55	10.18	S.L	18.22	10.42	5.36	1.72	0.61	9.44	7.34	2.11	22.82
		55 - 90	2.41	S.C.L	35.21	21.88	9.64	3.69	1.15	10.48	7.56	2.38	30.11
		90 - 120	0.00	S.C.L	38.72	25.56	8.56	4.71	0.82	12.16	7.38	2.73	28.43
AC12	**20**	**0 - 25**	6.25	S.L	22.28	14.7	4.65	2.16	0.62	9.69	7.34	3.46	26.82
		25 - 70	8.52	S.C.L	29.63	18.78	5.76	3.58	1.44	12.08	7.21	6.18	18.46
		70 - 120	10.22	L.S	14.52	8.61	3.42	1.74	0.9	11.98	7.54	6.14	23.17
			8.33										
AC21	**22**	**0 - 25**	5.75	S.C.L	38.68	25.9	7.75	4.11	1.79	10.63	7.31	5.75	17.25
		25 - 60	8.12	C.L	33.25	23.23	6.76	3.92	1.22	11.79	7.22	6.14	11.72
		60 - 110	10.42	S.C.L	31.72	20.82	6.24	2.77	1.79	8.73	7.23	6.55	27.11
AC22	**27**	**0 - 20**	0.00	S.C.L	30.42	20.44	5.67	2.41	1.04	7.92	7.26	2.62	11.6
		20 - 45	0.00	S.L	19.31	13.51	3.62	1.63	0.7	8.44	7.28	2.15	26.07
		45 - 85	0.00	S.L	24.56	16.42	4.64	3.43	1.22	13.97	7.41	1.63	20.28
		85 - 120	0.00	C.L	43.84	31.69	8.52	4.61	0.68	10.52	7.66	1.47	18.13

Agricultural soil suitability

The Pro&Eco Model was used to product land suitability for some common crops cultivated in the study area including: Wheat, maize, melon, potato, soybean, cotton, sun flower, and sugar beat as annuals; alfa alfa as semiannual; and peach, citrus and olive as perennials. Table (5) represents the suitability classes for the different crop and reveals the following:

Table 5: Land capability classes

Mapping unit	Capability class	Mapping unit	Capability class
WP 31	S3lrb	AW 12	S1
WP 32	S3lb	AW 21	S3l
WP 33	S3lb	AW 22	S1
EP 31	S3lrb	AC 11	S1
EP 32	S3lb	AC 12	S2l
EP 33	S3lb	AC 21	S2l
AW 11	S2l	AC 22	S1

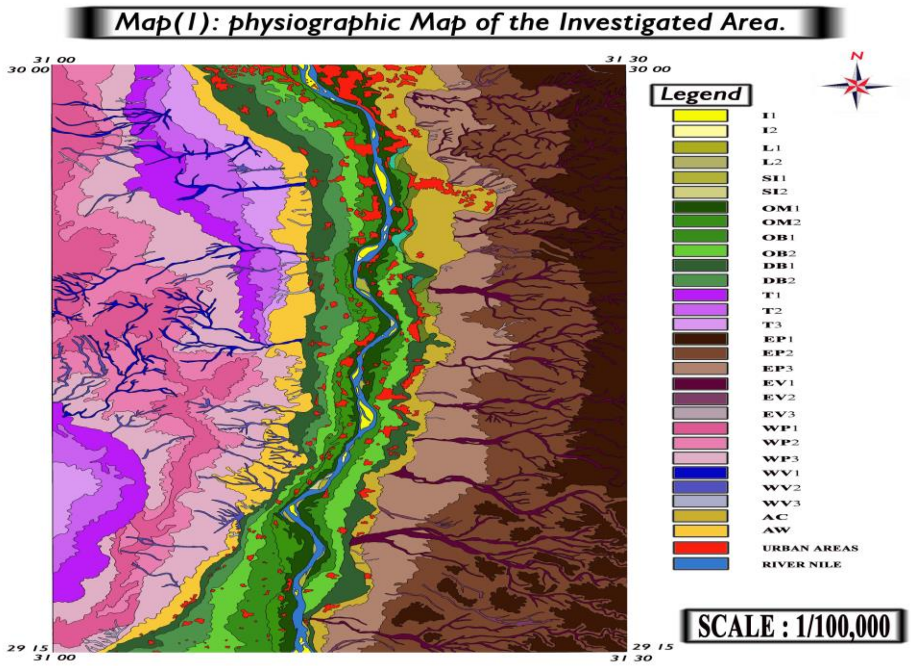

Fig. 1: the Physiographic and soil mape

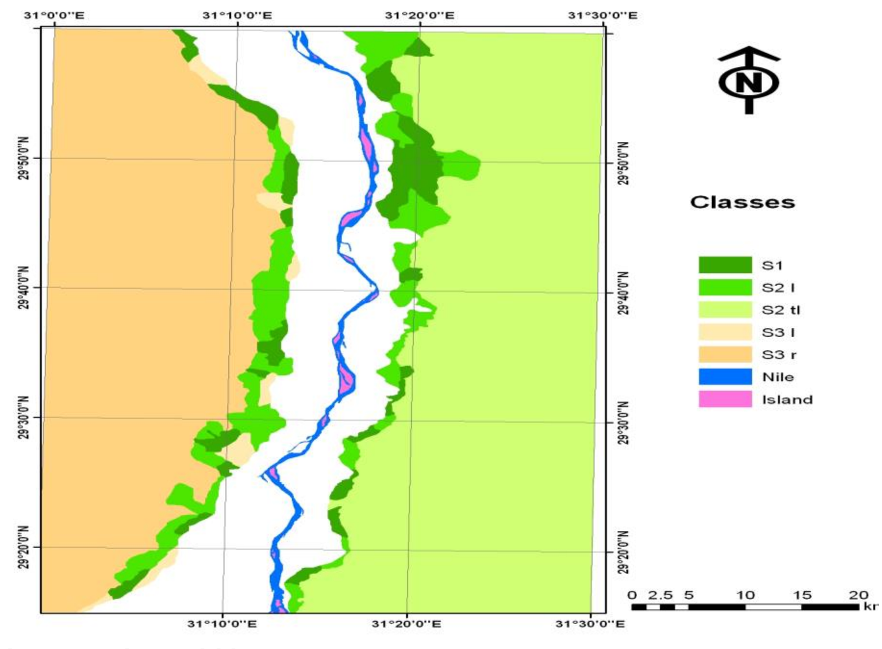

Fig. 2: land capability classes

The geo-spatial distribution of the soil suitability in the study area for cotton cultivated showed that more than 10% of the area is classified as the optimum suitable areas (S1), which occurred in the mapping units of AW11 and AW12.and 22% of the area is classified as high suitable areas(S2) , which occurred in the mapping units of AW21, AW22, AC11, AC12, AC21, AC22 , and the other mapping unit is classified as moderate suitable areas (S3). However three mapping units EP31 EP32 and EP33, indicate poor suitable areas(S4,S5) for all selected crops due to its high content of coarse fragments, moreover, the excessively drainage condition and the high content of calcium carbonate and salts. Accept that, they have moderate suitable to cultivate Olive.

On the other hand, more than 7% is classified as the optimum suitable for sugar beat cultivation (S1) which occurred in the mapping units of AC21 and AC22 and 21% of the area is high suitable in AW11 and AW12 AW21, AW22, AC11, AC12 and the other mapping unit is classified as moderate suitable areas (S3). As for soil suitability for olive, the model predicted that approximately 25% of the studied area has high suitable areas in WP32, AW11, AW12, AC11, AC12, and the other mapping unit is classified as moderate suitable areas. While the geo-spatial distribution of the soil suitability for peach and citrus indicate that 31% of the study area was classified as poor suitable areas due to their high soil salinity in AW21, AW22, EP31, EP32 and EP33, the other areas are clarified as (S2) in WP32, AW11 AW12, AC11, AC12, AC22, and (S3)in WP31, WP33 and AC21. It was evident that most of the study area has high to moderate suitability for Wheat, Maize, Melon, Potato, Soybean, Sun flower and Alfa Alfa but there is one mapping unit EP31 EP32 and EP33, which is poor suitable area due to its high content of coarse fragments, moreover, the excessively drainage condition and the high content of calcium carbonate and salts.

Table 5: suitability classes for the different crops

Mapping Unit	Sun flower	Alfa Alfa	Potato	soybean	Wheat	Maize	Melon
WP31	S3tcsa	S3tcsa	S3tsa	S3tcsa	3tcsa	S3tsa	S3tsa
WP32	3tcs	S3ts	3tcs	S3ts	S3ts	3tcs	3tcs
WP33	S3tcsa	S3tcsa	S3tsa	S3tcsa	S3tcsa	S3tsa	S3tsa
AW11	S2tca	S2tca	S2a	S2tca	S2tca	S2ta	S2a
AW12	S2tca	S2tca	S2a	S2tca	S2tca	S2ta	S2a
AW21	S3tcsa	S3tcsa	S3sa	S3tcsa	S3tcsa	S3tsa	S3sa
AW22	S3tcsa	S3tcsa	S3sa	S3tcsa	S3tcsa	S3tsa	S3sa
EP31	S5tsa	S5tsa	S5tcsa	S5tsa	S5ta	S5tca	S5tcsa
EP32	S5tsa	S5tsa	S5tcsa	S5tsa	S5ta	S5tca	S5tcsa
EP33	S5tcsa	S5tcsa	S5tcsa	S5tcsa	S5tcsa	S5tcsa	S5tcsa
AC11	S2ta	S2ta	S2da	S2da	S2ta	S2tda	S2da
AC12	S2tsa	S2tsa	S2dcsa	S2tsa	S2tsa	S2tdcsa	S3dcsa
AC21	S2sa	S2sa	S2tcsa	S2sa	S3sa	S3csa	S3tcsa
AC22	S2a	S2a	S2tca	S2a	S2a	S2ca	S2tca

Conclusion

The western part of the study area showed healthier soil quality than the eastern one. These results manifested the impact of human activity on the ecosystem and its power to convert unstable areas to usable. There is a great need to improve irrigation and drainage systems to increase land capability of the study area. Human impact on the ecosystem and incorporating indigenous knowledge must be considered if any sustainable development to be successful.

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تقييم زراعي بيئي لتقدير قدره استغلال الارض ومدى ملائمتها للزراعه ببعض المناطق الصحراويه المتاخمه بمحافظه الجيزه

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تم عمل تقييم زراعي بيئي لتقدير قدره استغلال الارض ومدى ملائمتها للزراعه ببعض المناطق الصحراويه المتاخمه بمحافظه الجيزه باستخدام برنامج MicroLEIS IP (Integrated Package) . وقد اوضحت النتائج ان معظم اراضي المنطقه ذات قدره متوسطه على الإنتاجيه الزراعيه(S3lb) وان اهم العوامل المحدده للإنتاجيه هي حاله الارض. كذلك أوضحت توقعات الملائمه للمحاصيل المختلفه ان 10% من منطقه الدراسه ملائمه جدا لزراعه القطن(S1) في حين أن 7% ملائمه جدا لزراعه بنجر السكر وبالإضافه لهذا فإن اكثر من 20% من منطقه الدراسه يعتبر عاليه الملائمه لزراعه القطن , بنجرالسكر, تباع الشمس, البرسيم, البطاطس, فول الصويا واشجار الخوخ و الحمضيات. هذا بالإضافه الى انه توجد بعض الوحدات وجدت حديه الملائمه(S4 and S5) لزراعه المحاصيل المختاره وهي (EP31, EP32 and EP33) ويرجع السبب في ذلك الى ارتفاع نسبه الحصى بالإضافه الى ارتفاع محتواها من الاملاح أما زراعه الزيتون فتعبر متوسطه الملائمه في هذه الوحدات. واشارت النتائج الى ان 36-40% من منطقه الدراسه تعتبر متوسطه الانتاجيه لزراعه الزيتون, القمح, الذره و القرع.

J. Agric. Sci. Mansoura Univ., 32 (10): 8745 - 8756, 2007

Table 2: Physiographic and Soil map legend of the studied area

Mapping unit	Lithology	Land form	Phase	Area km^2	Area %	Kind of mapping unit	Main and associated soils
EP31	Eocene (limestone and clay deposits) and Pliocene (gravels and sands)	Relatively low Plateau	Barren	**161.3**	**14.65**	Consociation	Torripsamments
EP32			Cultivated with crops	**90.4**	**8.21**	Consociation	Torriorthents
EP33			Cultivated with crop and Orchards	**108.3**	**9.84**	Complex	Torriorthents
				60.3	**5.48**		Torripsamments
				41.8	**3.80**		Calciorthids
AC11	Nile mud, Paleolithic and Pliocene (Chellen, Achellen, River silts, sands, gravels) and Eocene (limestone and clay)	Relatively high Parts	Cultivated with crops	**28.2**	**2.56**	Consociation	Torripfluvents
AC12			Cultivated with crops and Orchards	**56.7**	**5.15**	Consociation	Torripfluvents
				174.5	**15.85**		Torripsamments
AC21		Relatively low Parts	Cultivated with crops	**96.2**	**8.74**	Consociation	Torripfluvents
AC22			Cultivated with crops and Orchards	**116.3**	**10.56**	Consociation	Torripfluvents
WP31	Cretaceous, Eocene (limestone , clay and sands) and Pliocene (gravels and sands)	Relatively low Plateau	Barren	**46.2**	**4.20**	Consociation	Torripsamments
WP32			Cultivated with crops	**65.7**	**5.97**	Consociation	Torripsamments
WP33			Cultivated with crops and Orchards	**21.5**	**1.95**	Consociation	Torripsamments
AW11	Nile mud, Paleolithic and Pliocene (River silts, sands, gravels) and Cretaceous (sandstone)	Relatively high Parts	Cultivated with crops	**33.6**	**3.05**	Consociation	Torripfluvents
AW12			Cultivated with crops and Orchards	**161.3**	**14.65**	Association	Torripsamments
				90.4	**8.21**		Torripfluvents
AW21		Relatively low Parts	Cultivated with crops	**108.3**	**9.84**	Consociation	Torripfluvents
AW22			Cultivated with crops and Orchards	**60.3**	**5.48**	Consociation	Torripsamments